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GEOSCIENCE INFORMATION SYSTEM (GSIS) AND THE MANAGEMENT OF NEW BRUNSWICK MINERAL RESOURCES

R.R. Irrinki, Senior Geologist

Geographic Information Systems (GIS) are now widely used for the management of natural resources. The Timber Management Branch of the New Bruswick Department of Natural Resources and Energy has been using the ARC/INFO Geographic Information System to manage the timber resource for the past ten years.

The Geoscience Information System (GSIS) is a combination of computer hardware and software that is capable of manipulating geoscience data, having both locational and non-locational attributes. It represents the Geographic Information System (GIS) for geoscience needs. An important role of the GSIS is data management. Large quantities of geoscience data must be manipulated and integrated in a safe and efficient manner.

In 1988, the Geological Surveys Branch recoginzed the need for a Geographic Information System for three main reasons: base-map maintenance; geoscience data compilation; and geoscience data integration. The Branch then submitted a proposal to the Minerals and Energy Division for a GIS Pilot Project. The Division approved the project and provided $150 000 funding through the Canada-New Brunswick Mineral Development Agreement. Using this as base funding, the Minerals and Energy Division approached the Department of Commerce and Technology for additional funding in the amount of

$225 000. This funding was provided for the purchase of GIS hardware and consulting fees to customize the CARIS (Computer-Aided Resource Information System) software for geoscience needs. The Department of Commerce and Technology promotes the locally developed CARIS software marketed by Universal Systems Ltd. of Fredericton.

The Pilot Project is defined as the customization of CARIS software for the Geoscience Information System. The purpose of this project is to evaluate the potential of GIS techniques for the management of New Brunswick mineral resources.

The California Lake (21 O/8) area was chosen for the Pilot Project (Figure 1). It is one of 90 - 1:50 000 National Topographic System map areas within New Brunswick. Each 1:50 000 map area is divided into 25 - 1:10 000 map areas. This NTS map area was chosen because of the availability of LRIS standard 1:10 000 digital base maps, pre-plotted assessment data, and the presence of numerous geoscience data sets.

The hardware configuration of the system consists of one SPARC 370 SERVER with 32 megabytes of memory and 1.5 gigabytes of hard-disk storage, one SUN 4 workstation with 16 megabytes of memory and 700 megabytes of hard-disk storage, two 19" colour monitors, one E-size pen plotter, one E-size digitizer, one USL controller, and one Tektronics screen dump (Figure 2). UNIX is the operating system for the hardware; CARIS is the GIS software and is used to manage the graphic database; and INGRES

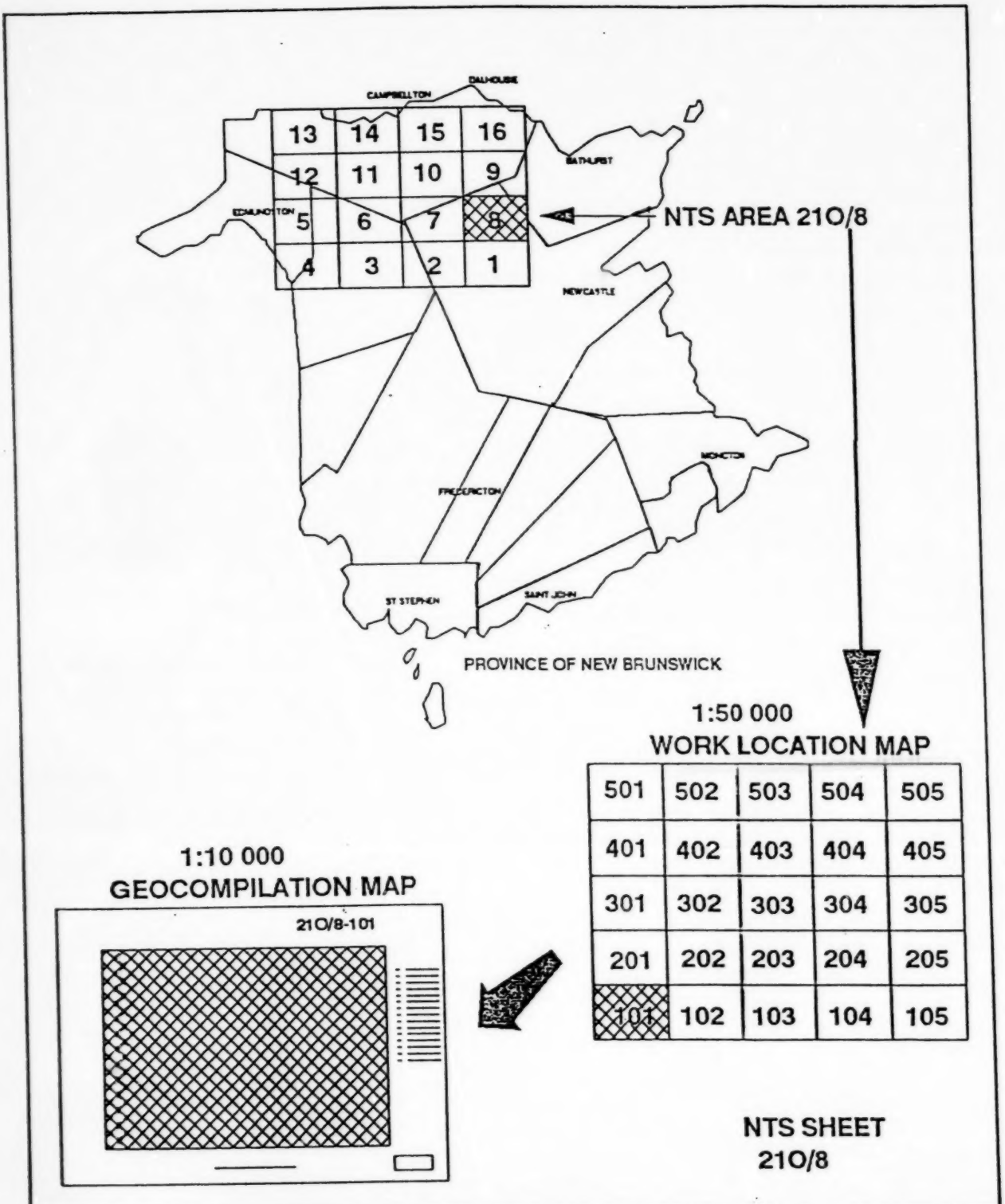
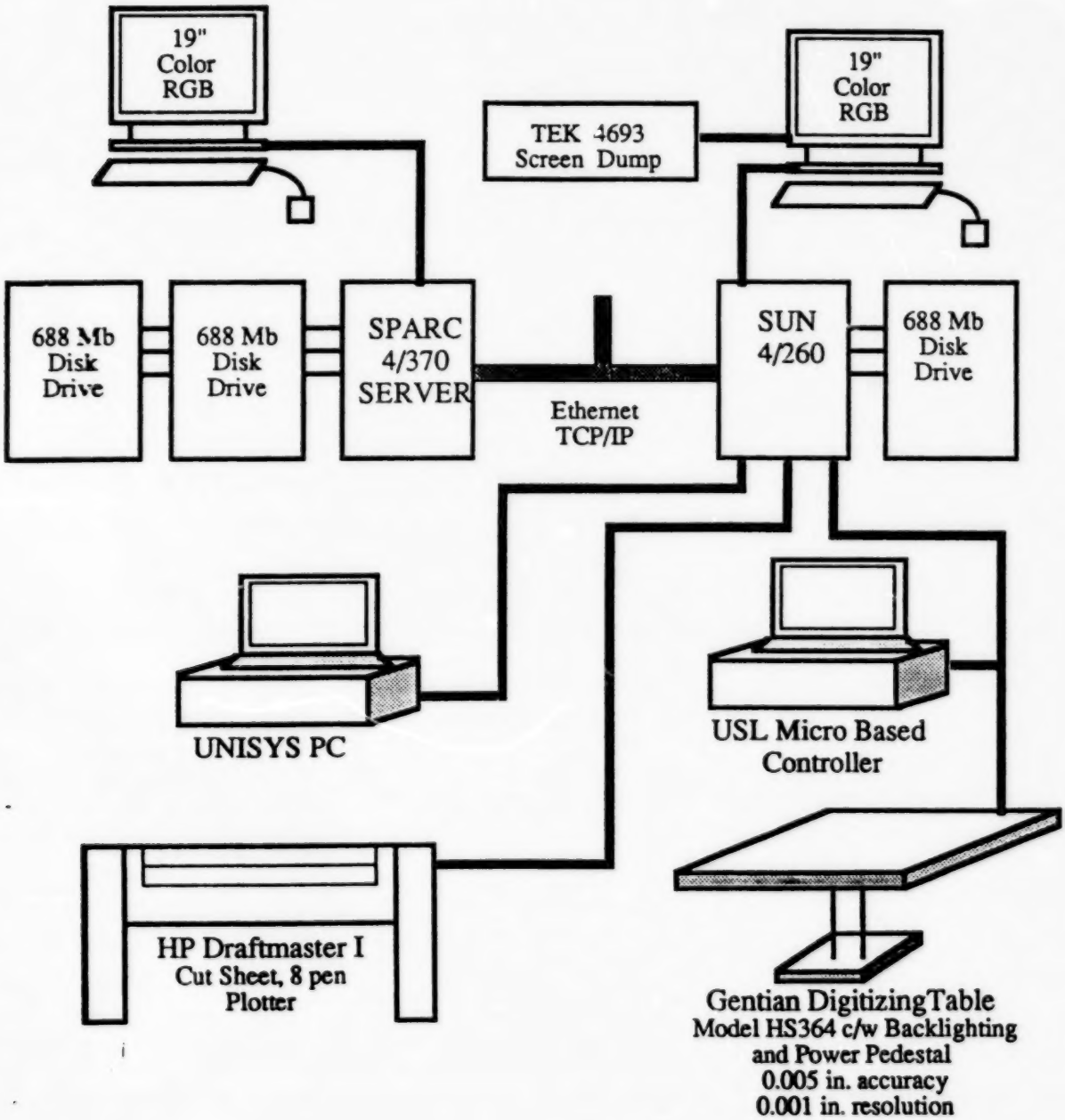


Figure 1. Index map showing part of the NTS grid for northern New Brunswick (21 O) and the location of NTS 21 O/8. The inset shows the numbering system for the twenty-five 1:10 000 geocompilation maps within 21 O/8.

FIGURE 2

NB Department of Natural Resources
Minerals Division
CARIS Hardware Configuration



is the alphanumeric database that is used for attribute data management.

CUSTOMIZATION OF DIGITAL BASE MAPS

The Geological Surveys Branch staff use base maps ranging in scale from 1:5000 to 1:500 000. Traditionally, hard copies of the maps at scales of 1" = 20 chains and 1" = 40 chains have been obtained from the Lands Branch; 1:50 000 and 1:250 000 from Energy, Mines and Resources, Ottawa. In order to maintain a geoscience database at 1:20 000 scale for most parts of New Brunswick, and 1:10 000 where the data are warranted, the Geological Surveys Branch was forced to find an alternate source for these base maps.

The Geological Surveys Branch tried to produce 1:10 000 base maps by contracting them out to LRIS (formerly MRMS). This approach cost the Branch $110 000 per NTS sheet. In order to cut costs, the Branch found three alternate sources for digital base maps.

LRIS has 1:10 000-scale digital base maps for 60% of New Brusnwick with the remainder to be completed by 1993. The second source is the Timber Management Branch, which has complete coverage of the Province at 1:12 500 scale. The third source is Energy, Mines and Resources, which has complete coverage of New Brunswick at 1:250 000 scale and partial coverage at 1:50 000 scale. The cost of acquiring the digital base-map files from outside sources is $150 to $500/map file.

The digital base maps from LRIS, Timber Management, and EMR were manipulated and customized using CARIS. LANDSAT data were also used to update these base maps. Hard copies were produced at 1:10 000, 1:20 000, 1:50 000, and 1:250 000 scale.

GEOSCIENCE DATA COMPILATION

One of the priorities of the Minerals and Energy Division is to present all the geoscientific information available in the assessment files, which are submitted by mining companies and prospectors to describe the work done on their mineral claims. Because of the great amount of these data, manual treatment of this information is becoming more and more cumbersome, inefficient, and expensive. In order to use the information more effectively, the Geological Surveys Branch started to compile these data, beginning with NTS 21 O/8. This work was contracted out at a cost of $80 000. The data were published as 125 - 1:10 000 maps that include base, geology, geophysics, geochemistry, and annotation layers. Work-location maps at 1:50 000 scale were published as four maps consisting of the work done between 1950-59, 60-69, 70-79, and 80-present. This project was integrated with the GIS when it became available.

Geology, geophysics, geochemistry, annotation, and work-location maps were manually digitized by using CARIS. Feature codes and symbology (Appendix I) were created for all the plotted features and symbols. Several graphic menus were designed for faster and easier digitization of geoscience

data. Five database files (consisting of geology, geophysics, airborne geophysics, geochemistry, and drilling) were created in both dBASE and INGRES.

GEOLOGICAL DATA MAINTENANCE

The Geological Surveys Branch staff have been involved in the collection of geoscience data. The Branch manages a geoscientific database acquired over 50 years by itself, the Federal Government, academic institutions, exploration companies, and prospectors. These data are commonly published in hardcopy format. Only about 50% of the recorded data is actually presented in these publications.

The Geological Surveys Branch publishes geological maps at 1:15 840, 1:31 680, 1:50 000, and 1:250 0000 scales. In order to comply with the Branch policies, the data have to be transferred to 1:20 000 scale. The Geological Survey of Canada publishes their maps at 1:50 000 scale; these data have to be transferred to 1:20 000 scale for integration purposes. Manual conversion of geoscience data to 1:20 000 scale is not only expensive, but time-consuming.

The geoscience data available at various scales were integrated with the GIS system. Feature codes were created for all the rock formations in New Brunswick. Several database files associated with each rock exposure were maintained in dBASE and INGRES.

GEOPHYSICAL DATA MAINTENANCE

Geophysical data are gathered mainly by the Geological Survey of Canada and published as 1:50 000 maps. These data consist of airborne magnetics, airborne radiometrics, and airborne VLF. Gravity data are also available at wide intervals. Ground geophysical data are also available for various parts of New Brunswick.

The Geological Survey of Canada scanned airborne geophysical data. Ten layers of these data are converted to CARIS format. These layers consist of total-exposure radiometrics, total-count potassium, total-count uranium, total-count thorium, uranium/thorium ratios, uranium/potassium ratios, thorium/potassium ratios, total field magnetics, VLF (quadrature), and VLF total electric field.

Seven bands of LANDSAT 5 have been converted to CARIS format. These are TM1 (visible blue), TM2 (visible green), TM3 (visible red), TM4 (short-wave reflected infrared), TM5 (middle-wave reflected infrared), TM6 (thermal-infrared), and TM7 (long-wave reflected infrared).

These seventeen layers of geophysical and remote sensing data are incorporated into the Geoscience Information System.

GEOCHEMISTRY DATA MAINTENANCE

The Geological Surveys Branch and the Geological Survey of Canada collect samples of stream sediments, water, soil, till, and rock as part of geochemical exploration. The samples are

then analysed for 20 to 30 elements such as copper, lead, zinc, and mercury. These data are published on geochemical map plates.

These geochemical data have been incorporated into the Geoscience Information System. Several dBase and INGRES tables have been prepared for the management of the data.

MINERAL-OCCURRENCE DATA MAINTENANCE

The data on 800 mineral occurrences have been maintained by the New Brunswick Computerized Mineral Occurrence Database, which is managed by four dBase files. These files for 21 O/8 have been converted to INGRES. Batch digitization of these occurrences was carried out by using UTM coordinates.

MINERAL-DEPOSIT DATA MAINTENANCE

Drill-hole data on several major deposits are presently managed by four dBase files, which include information on location, deviation, assays, and geology. A special software package by Geostat Systems International Incorporated has been used to produce cross- and longitudinal sections, plans, histograms, and to estimate reserves from the drill-hole data.

The four databases have been converted to INGRES. The graphic files have been converted to CARIS in order to incorporate with the GIS.

MINING PLANS AND RECLAMATION DATA STORAGE

The Mineral Development Branch receives and stores mining

and reclamation plans for all developing mines. The reclamation and mining plans submitted by Heath Steele Mines for their Heath Steele and Stratmat properties have been manually digitized and incorporated into the GIS system.

CLAIM-TRACKING SYSTEM

The Mineral Development Branch records mineral claims staked in the Province by using a claim-tracking system that is managed by dBase programs. These claims are manually plotted on 1:50 000-scale maps and are frequently updated.

The claims for NTS 21 O/8 have been digitized and incorporated with the GIS System. The dBase files have been converted to INGRES.

SAND AND GRAVEL PIT MANAGEMENT

The data on sand and gravel pits are managed by a database file using the WANG System. The location of each pit is manually plotted on 1" = 40 chain maps.

The locations of gravel pits within NTS 21 O/8 have been digitized and integrated into the GIS System.

GEOSCIENCE DATA INTEGRATION

The above digital data sets, consisting of base maps, compilation data, geology, geophysics, geochemistry, remote sensing, mineral occurrences, mineral deposits, mining, reclamation, sand and gravel, and mineral claims have been integrated into the Geoscience Information System. It is now

possible to retrieve the data in various combinations. The required layers would then be plotted with the pen plotter or by using the Tektronics screen dump.

SPATIAL ANALYSIS AND MODELLING

Spatial analyses involve combining data from multiple spatial data sets and performing spatial analysis techniques and modelling on the GIS data sets to transform data into information suitable for a given purpose. For example, if an exploration company is looking for exploration targets, the data sets should contain geology, geophysics, geochemistry, mineral occurrences, and assessment data layers. Each data set will be weighted in comparison to the others, with the resulting data providing the target areas.

CONCLUSION

The Geoscience Information System Pilot Project is successful. It has demonstrated the usefulness of the CARIS Geoscience Information System for the management of New Brunswick Mineral Resources. These data will be released to the public in various graphics exchange formats such as NTX (CARIS), DXF (AutoCAD), Digital Line Graph (DLG) and Standard Interchange Format (SIF). The Pilot Project is further expanded to include management of the Canada-New Brunswick Cooperation Agreement on Mineral Development (MDA II: 1990-95) data. During the next five years, geological data will be gradually integrated into the Geoscience Information System.

APPENDIX I

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GEOLOGY - Feature	Code
1. Outcrops	GGOC___
2. Boundaries	GGGB___
3. Bedding	GGBK___
	GGBU___
4. Cleavage	GGCL___
5. Schistosity	GGSH___
6. Gneissosity	GGGS___
7. Lineations	GGLN___
8. Banding	GGBA___
9. Igneous flow structures	GGIF___
10. Faults	GGFN___
	GGFT___
	GGFZ___
11. Folding	GGAF___
	GGSF___
12. Jointing	GGJT___
	GGJS___
	GGJG___
13. Localities	GGLO___
14. Isograds	GGMI___
15. Drillholes	GGDH___
16. Dykes - veins	GGMD___
	GGDD___
	GGFD___
	GGQD___
	GGGD___
	GGAD___
17. Textures	GGTP___
	GGTB___
	GGTH___
	GGTS___
18. Abbreviations	GGAE___
	GGAM___
	GGAC___
	GGAA___

GEOLOGY FEATURE CODES - (GG)

FEATURE CODE	SYMBOL	FEATURE
		Outcrops
GGOCR		Rock Outcrop
GGOCA		Area of Outcrop
GGOCP		Probable Outcrop
GGOCF		Float
		Boundaries - General
GGGBD		Defined
GGGBP		Approximate
GGGBS		Assumed
GGGBL		Limit of Mapping
		Bedding Tops Known
GGBKH		Horizontal
GGBKI3		Inclined
GGBKO3		Overturned
GGBKU		Dip Unknown
GGBKV		Vertical
		Bedding Tops Unknown
GGBUI3		Inclined
GGBUV		Vertical
GGBUU		Dip Unknown

FEATURE CODE	SYMBOL	FEATURE	
		Cleavage	
GGCLH01		Horizontal	
GGCLI31		Inclined	S_1
GGCLV01		Vertical	
GGCLU01		Dip Unknown	
GGCLH02		Horizontal	
GGCLI32		Inclined	S_2
GGCLV02		Vertical	
GGCLU02		Dip Unknown	
GGCLH03		Horizontal	
GGCLI33		Inclined	S_3
GGCLV03		Vertical	
GGCLU03		Dip Unknown	
GGCLH04		Horizontal	
GGCLI34		Inclined	S_4
GGCLV04		Vertical	
GGCLU04		Dip Unknown	
		Foliation - Schistosity	
GGSHH		Horizontal	
GGSHI3		Inclined	
GGSHV		Vertical	
GGSHU		Dip Unknown	

FEATURE CODE	SYMBOL	FEATURE	
		Gneissosity, Foliation	
GGGSH		Horizontal	
GGGSI3		Inclined	
GGGSV		Vertical	
GGGSU		Dip Unknown	
		Lineation	
GGLNU3		General Direction	
GGLNH31		Horizontal	
GGLNI31		Inclined, plunge known	L_1
GGLNI01		Inclined, plunge unknown	
GGLNV31		Vertical	
GGLNH32		Horizontal	
GGLNI32		Inclined, plunge known	L_2
GGLNI02		Inclined, plunge unknown	
GGLNV32		Vertical	
GGLNH33		Horizontal	
GGLNI33		Inclined, plunge known	L_3
GGLNI03		Inclined, plunge unknown	
GGLNV33		Vertical	
GGLNH34		Horizontal	
GGLNI34		Inclined, plunge known	L_4
GGLNI04		Inclined, plunge unknown	
GGLNV34		Vertical	

FEATURE CODE	SYMBOL	FEATURE
		Banding
GGBAI3		Inclined
GGBAV		Vertical
GGBAU		Dip Unknown
GGBAF3		Flow Banding
		Igneous Flow Structures
GGIFH		Horizontal
GGIFI3		Inclined
GGIFV		Vertical
GGIFU		Dip Unknown
		Faults - Normal and Strike Slip
GGFD		Defined
GGFP		Approximate
GGFA		Assumed
GGFND3		Normal Inclined, Dip Known
GGFNI		Normal Inclined, Dip Unknown
GGFNV		Vertical Fault
GGFSM		Strike Slip, Direction of Movement Known
GGFSI3		Strike Slip, Inclined
		Faults - Thrust
GGFTD		Defined
GGFTP		Approximate
GGFTA		Assumed

FEATURE CODE	SYMBOL	FEATURE
		Fault - Zones
GGFZSH		Schist Zone
GGFZSC		Shear Zone
GGFZS3		Shear Zone, dip indicated
		Macroscopic Anticlinal Folds
GGADD3		Defined
GGADO3		Defined, overturned
GGADP3		Defined, plunging
GGADQ3		Defined, overturned & plunging
GGADF3		Defined, Antiform
GGADG3		Defined, Antiform & plunging
GGAAA3		Approximate
GGAAO3		Approximate, overturned
GGAAP3		Approximate, plunging
GGAAQ3		Approximate, overturned & plunging
GGAAF3		Approximate, Antiform
GGAAG3		Approximate, Antiform & plunging
GGASD3		Defined Fold (Antiform/Synform)
GGASA3		Approximate Fold (Antiform/Synform)
GGASPD3		Defined, plunging fold (Antiform/ Synform)
GGASPA3		Approximate, plunging fold (Antiform/Synform)

FEATURE CODE	SYMBOL	FEATURE
		Macroscopic Synclinal Folds
GGSDD3		Defined
GGSDO3		Defined, overturned
GGSDP3		Defined, plunging
GGSDQ3		Defined, overturned & plunging
GGSDF3		Defined, synform
GGSDG3		Defined, Synform & plunging
GGSAA3		Approximate
GGSAO3		Approximate, overturned
GGSAP3		Approximate, plunging
GGSAQ3		Approximate, overturned & plunging
GGSAF3		Approximate, Synform
GGSAG3		Approximate, synform & plunging
GGSAFM		Minor Folds
		Jointing
GGJTH		Horizontal
GGJTI3		Inclined
GGJTV		Vertical
GGJTU		Dip Unknown
GGJS3		Slickenside, plunge known
GGJS0		Slickenside, plunge unknown
GGJG		Tension gashes

FEATURE CODE	SYMBOL	FEATURE
		Localities
GGLOF		Fossil
GGLOA3		Age Determination (in million yrs)
		Metamorphic Isograds
GGMIB		Biotite
GGMIA		Andalusite
GGMIS		Sillimanite
GGMIG		Garnet
		Drillholes
GGDHW3		Water Well
GGDHB3		Bore Hole
GGDHDU3		Diamond-drill hole, dip unknown
GGDHDV3		Diamond-drill hole, vertical
GGDHDI3		Diamond-drill hole, inclined
GCADS3		Overburden drillhole
		Dykes - Veins
GGMDD		Mafic Dyke, defined
GGMDA		Mafic Dyke, approximate
GGFDD		Felsic Dyke, defined
GGFDA		Felsic Dyke, approximate
GGQDD		Quartz Vein, defined
GGQDA		Quartz Vein, approximate

FEATURE CODE	SYMBOL	FEATURE
GGGDD		Granite Dyke, defined
GGGDA		Granite Dyke, approximate
GGADD		Greisen Vein, defined
GGADA		Greisen Vein, approximate
		Textures
GGTPK		Pillows, tops known
GGTPU		Pillows, tops unknown
GGTPO		Pillows, overturned
GGTBG		Graded Bedding
GGTBE		Explosive Breccia
GGTBI		Intrusive Breccia
GGTBP		Pyroclastic Breccia
GGTBS		Slump Breccia
GGTBT		Tectonic Breccia
GGTBY		Hyaloclastite
GGTBA		Porphyritic, >50% phenocrysts
GGTBN		Porphyritic, <50% phenocrysts
GGTBX		Spinifex texture
GGTBV		Variolitic, spherulitic, phacoidal

FEATURE CODE	SYMBOL	FEATURE
	Abbreviations For Rock Types	
GGRAAB	AB	Amphibolite
GGRAAD	AD	Andesite
GGRAAG	AG	Argillite
GGRAAP	AP	Aplite
GGRAAR	AR	Anorthosite
GGRAAT	AT	Andesite Tuff
GGRABL	BL	Basalt
GGRABX	BX	Volcanic Breccia
GGRACG	CG	Conglomerate
GGRACH	CH	Chert
GGRACS	CS	Calc-silicate
GGRADB	DB	Diabase
GGRADC	DC	Dacite
GGRADH	DH	Dolomite
GGRADR	DR	Diorite
GGRADT	DT	Dacite Tuff
GGRAGB	GB	Gabbro
GGRAGD	GD	Granodiorite
GGRAGL	GL	Granulite
GGRAGP	GP	Granophyre
GGRAGN	GN	Gneiss
GGRAGS	GS	Granite, younger if more than one
GGRAGT	GT	Granite
GGRAGW	GW	Greywacke
GGRAHF	HF	Hornfels
GGRAHY	HY	Hybred
GGRAIR	IR	Iron-formation
GGRALP	LP	Lamprophyre
GGRALS	LS	Limestone
GRAMA	MA	Marble
GGRAMZ	MZ	Monzonite
GGRAOG	OG	Orthogneiss
GGRAOQ	OQ	Orthoquartzite

FEATURE CODE	SYMBOL	FEATURE
GGRAPD	PD	Peridotite
GGRAPG	PG	Paragneiss
GGRAPH	PH	Phyllite
GGRAPM	PM	Pegmatite
GGRAPT	PT	Pyroxenite
GGRAQF	QF	Quartz-feldspar Porphyry
GGRAQK	QK	Quartz-keratophyre
GGRAQM	QM	Quartz Monzonite
GGRAQP	QP	Quartz Porphyry
GGRAQT	QT	Quartzite
GGRARD	RD	Rhyodacite
GGRARF	RF	Rhyodacite Tuff
GGRARL	RL	Rhyolite Flow
GGRARP	RP	Rhyolite Porphyry
GGRART	RT	Rhyolite Tuff
GGRARX	RX	Rhyolite Tuff, Pyrite-rich
GGRASA	SA	Arkosic Sandstone
GGRASB	SB	Biotie Schist
GGRASC	SC	Chlorite Schist
GGRASH	SH	Shale
GGRASL	SL	Slate
GGRASM	SM	Sericite Schist
GGRASN	SN	Siltstone
GGRASS	SS	Argillaceous Sandstone
GGRAST	ST	Sandstone
GGRASY	SY	Syenite
GGRATS	TS	Talc Schist
GGRAUM	UM	Ultramafic

FEATURE CODE	SYMBOL	FEATURE
	Mineral Abbreviations	
GGAEAK	ak	Actinolite
GGAEAE	ae	Aegirine
GGAEAB	ab	Albite
GGAEAL	al	Almandine
GGAEAT	at	Alunite
GGAEAM	am	Amphibole
GGAEAD	ad	Andalusite
GGAEAH	ah	Anhydrite
GGAEAY	ay	Anthophyllite
GGAEAP	ap	Apatite
GGAEASP	asp	Arsenopyrite
GGAEASB	asb	Asbestos
GGAEAUG	aug	Augite
GGAEAX	ax	Axinite
GGAEBA	ba	Barite
GGAEBY	by	Beryl
GGAEBI	bi	Biotite
GGAEBS	bs	Bismuthinite
GGAEBO	bo	Bornite
GGAEKM	km	Carnallite
GGAEKS	ks	Cassiterite
GGAECA	ca	Calcite
GGAECC	cc	Cancrinite
GGAECS	cs	Cerrusite
GGAECN	cn	Chalcedony
GGAECP	cp	Chalcopyrite
GGAECH	ch	Chlorite
GGAECR	cr	Chromite
GGAEHG	hg	Cinnabar
GGAECPX	cpx	Clinopyroxene
GGAECB	cb	Cobaltite
GGAECL	cl	Columbite
GGAECT	ct	Cordierite
GGAECOR	cor	Corundum
GGAECV	cv	Covellite
GGAECRD	crd	Crocidolite
GGAEDA	da	Datolite
GGAEDL	dl	Diallage
GGAEDT	dt	Dickite
GGAEDI	di	Diamond
GGAEDP	dp	Diopside
GGAEDOL	dol	Dolomite

FEATURE CODE	SYMBOL	FEATURE
GGAEEP	ep	Epidote
GGAEFK	fk	k-Feldspar
GGAEFP	fp	Plagioclase Feldspar
GGAEFL	fl	Fluorite
GGAEGN	gn	Galena
GGAEGT	gt	Garnet
GGAEGK	gk	Glauconite
GGAEG	g	Gossan
GGAEGF	gf	Graphite
GGAEGS	gs	Gravel & Sand
GGAEGYP	gyp	Gypsum
GGAENA	na	Halite
GGAEHEM	hem	Hematite
GGAEH	h	Hornblende
GGAEHY	hy	Hypersthene
GGAEIT	it	Illite
GGAEIL	il	Ilmenite
GGAEBIF	bif	Iron Formation
GGAEJR	jr	Jarosite
GGAEKL	kl	Kaolinite
GGAELS	ls	Limestone
GGAELM	lm	Limonite
GGAELE	le	Lepidolite
GGAELC	lc	Leptochlorite
GGAEMAG	mag	Magnetite
GGAEMAL	mal	Malachite
GGAEMA	ma	Marcasite
GGAEMI	mi	Mica
GGAEMK	mk	Microcline
GGAEMO	mo	Molybdenite
GGAEMZ	mz	Monazite
GGAEMM	mm	Montmorillonite
GGAEMU	mu	Muscovite
GGAENC	nc	Nacrite
GGAENE	ne	Nepheline
GGAENT	nt	Nontronite

FEATURE CODE	SYMBOL	FEATURE
GGAEOV	ov	Olivine
GGAEOT	ot	Orthite
GGAEOR	or	Orthoclase
GGAEOZ	oz	Ozokerite
GGAEP	p	Pegmatite
GGAEPN	pn	Pentlandite
GGAEPW	pw	Perovskite
GGAEPL	pl	Phlogopite
GGAEPG	pg	Plagioclase
GGAEPY	py	Pyrite
GGAEPC	pc	Pyrochlore
GGAEPZ	pz	Pyrolusite
GGAEPI	pi	Pyrophyllite
GGAEPX	px	Pyroxene
GGAEPO	po	Pyrrhotite
GGAEQ	q	Quartz
GGAERA	ra	Radioactive minerals
GGAERO	ro	Rhodochrosite
GGAERU	ru	Rutile
GGAESK	sk	Scapolite
GGAESO	so	Scorodite
GGAESUP	sup	Serpentine
GGAESC	sc	Sericite
GGAESH	sh	Scheelite
GGAESID	sid	Siderite
GGAESI	si	Silica
GGAESIL	sil	Sillimanite
GGAESN	sn	Spessartite
GGAESPH	sph	Sphalerite
GGAETI	ti	Sphene
GGAESP	sp	Spinel
GGAESPO	spo	Spodumene
GGAEST	st	Staurolite
GGAESB	sb	Stibnite
GGAEBST	Bst	Building Stone
GGAES	s	Sulphides
GGAEK	k	Sylvite
GGAETK	tk	Talc
GGAETA	ta	Tantalite-columbite
GGAETE	te	Tellurides
GGAETT	tt	Tetrahedrite
GGAETM	tm	Titanomagnetite
GGAETL	tl	Tourmaline

FEATURE CODE	SYMBOL	FEATURE
GGAETR	tr	Tremolite
GGAETO	to	Topaz
GGAEVA	va	Vanadinite
GGAEVM	vm	Vermiculite
GGAEVS	vs	Vesuvianite
GGAEW	w	Wolframite
GGAEWO	wo	Wollastonite
GGAEZE	ze	Zeolite
GGAEZR	zr	Zircon

FEATURE CODE	SYMBOL	FEATURE
	Abbreviations for Rock-Forming Minerals	
GGAMAN	an	Alunite
GGAMAMP	amp	Amphibole
GGAMBI	bi	Biotite
GGAMCA	ca	Carbonate
GGAMCH	ch	Chlorite
GGAMCT	ct	Chloritoid
GGAMEP	ep	Epidote
GGGAMF	f	Feldspar
GGAMG	g	Garnet
GGAMH	h	Hornblende
GGAMMU	mu	Muscovite
GGAMNE	ne	Nepheline
GGAMK	k	Potassium Feldspar
GGAMPG	pg	Plagioclase
GGAMPX	px	Pyroxene
GGAMQ	q	Quartz
GGAMSC	sc	Sericite
GGAMSI	si	Sillimanite
GGAMTI	ti	Sphene
GGAMST	st	Staurolite
GGAMTO	to	Topaz
GGAMTL	tl	Tourmaline
GGAMTR	tr	Tremolite-Actinolite
GGAMZE	ze	Zeolite

FEATURE CODE	SYMBOL	FEATURE
	Abbreviations for Composition	
GGACF	f	Felsic
GGACM	m	Mafic
GGACMU	mu	Ultramafic
GGACIF	if	Iron Formation
GGACOX	ox	Oxide Iron Formation
GGACSI	si	Silicate Iron Formation
GGACMI	mi	Mafic Iron Formation
GGACCH	ch	Chert
GGACEX	ex	Exhalite

FEATURE CODE	SYMBOL	FEATURE
	Abbreviations for Alteration	
GGAAAL	al	Albitization
GGAAAM	am	Amphibolitization
GGAAAR	ar	Argillic
GGAACO	co	Carbonatization
GGAACH	ch	Chloritization
GGAAEP	ep	Epidotization
GGAAFE	fe	Hematization
GGAAHF	hf	Hornfels
GGAAPY	py	Pyritization
GGAAK	k	Potassic
GGAAPP	pp	Propylitization
GGAASC	sc	Sericitization
GGAASP	sp	Serpentinization
GGAASI	si	Silicification
GGAASK	sk	Skarn

~~SYMBOLOGY FOR~~ GEOCHEMISTRY FEATURE CODES

1) Federal (GSC) Surveys GCF___
2) Provincial (DNRE) Surveys GCP___
3) Data Compiled from Assessment Reports GCA___

FEATURE CODE	SYMBOL	FEATURE
		Federal (GSC) Surveys
GCFSS3		Stream-Sediment Sample Site
GCFHS3		Heavy-Mineral Stream Sample Site
GCFTS3		Till Sample Site
GCFOS3		Soil Sample Site
GCFLS3		Lake-Sediment Sample Site
GCFWS3		Water Sample Site
GCFVS3		Vegetation Sample Site
GCFBS3		Boulder Sample Site
GCFRS3		Lithogeochemical Sample Site
		Provincial (DNRE) Surveys
GCPSS3		Stream-Sediment Sample Site
GCPHS3		Heavy-Mineral Stream Sample Site
GCPTS3		Till Sample Site
GCPOS3		Soil Sample Site
GCPLS3		Lake-Sediment Sample Site
GCPWS3		Water Sample Site
GCPVS3		Vegetation Sample Site
GCPBS3		Boulder Sample Site
GCPRS3		Lithogeochemical Sample Site

FEATURE CODE	SYMBOL	FEATURE
	Data Compiled from Assessment Reports	
GCASS3		Stream-Sediment Sample Site
GCASC		Contour Line
GCASN		Contour Text - Value
GCASE		Contour Text - Elements
GCAHS3		Heavy-Mineral Stream Sample Site
GCAHC		Contour Line
GCAHN		Contour Text - Value
GCAHE		Contour Text - Elements
GCATS3		Till Sample Site
GCATC		Contour Line
GCATN		Contour Text - Value
GCATE		Contour Text - Elements
GCAOS3		Soil Sample Site
GCAOC		Contour Line
GCAON		Contour Text - Value
GCAOE		Contour Text - Elements
GCALS3		Lake-Sediment Sample Site
GCALC		Contour Line
GCALN		Contour Text - Value
GCALE		Contour Text - Elements

FEATURE CODE	SYMBOL	FEATURE
GCAWS3		Water Sample Site
GCAWC		Contour Line
GCAWN		Contour Text - Value
GCAWE		Contour Text - Elements
GCAVS3		Vegetation Sample Site
GCAVC		Contour Line
GCAVN		Contour Text - Value
GCAVE		Contour Text - Elements
GCABS3		Boulder Sample Site
GCABC		Contour Line
GCABN		Contour Text - Value
GCABE		Contour Text - Elements
GCARS3		Lithogeochemical Sample Site
GCARC		Contour Line
GCARN		Contour Text - Value
GCARE		Contour Text - Elements
GCADS3		Overburden Drillhole - With Depth in Text

SURFICIAL GEOLOGY FEATURE CODES

1) Boundaries	GSQB___
2) Glacial Fabric	GSGF___
3) Glacial Linear Features	GSGL___
4) Local Surficial Features	GSSF___
5) Post-Glacial Deposits	GSP___
6) Late and Post-Glacial Deposits	GSL___
7) Glacial-Glaciofluvial Deposits	GSG___
8) Pre-Quaternary Surfaces	GSQR___

FEATURE CODE	SYMBOL	FEATURE
		Boundaries
GSQBD		Defined
GSQBA		Approximate
GSQBI		Inferred
		Glacial Fabric
GSGFT		Tor
GSGFGK		Glacial Striation, Direction Known
GSGFGU		Glacial Striation, Direction Unknown
GSGFS		Striated Boulder
GSGFC		Clast Fabric Trend
GSGFR		Roche Moutonnée
		Glacial Linear Features
GSGLD		Drumlin, Drumlinoid Ridge, Fluted Surface
GSGLEK		Esker, Direction Known
GSGLEU		Esker, Direction Unknown
GSGLF		Abandoned Fluvial Channel
GSGLFS		Limits of Large Fluvial Channel

FEATURE CODE	SYMBOL	FEATURE
GSGLM		Moraine Ridge
GSGLI		Ice Contact Ridge
GSGLT		Top of Scarp
GSGLS		Marine Submergence Limit
GSGLB		Beach Ridge
GSGLL		Lineament
		Local Surficial Features
GSSFO		Outcrop
GSSFK		Kame
GSSFBF		Boulder Field
GSSFD		Small Sand Dune
GSSFSS		Sink Hole, small
GSSFSL		Sink Hole, large
GSSFB		Erratic Boulder
GSSFC		Cirque-like Feature
GSSFH		Kettle Hole
		Post-Glacial Deposits
GSPOP	Op	Organic Deposits, peat, muck, etc.
GSPA	A	Alluvial Deposits
GSPAP	Ap	Alluvial Plain, Floodplain
GSPAt	At	Alluvial Terrace
GSPCB	Cb	Colluvial Blanket
GSPE	E	Eolian Deposits
GSPEP	Ep	Eolian Plain
GSPEB	Eb	Eolian Blanket
GSPER	Er	Eolian - Dune

FEATURE CODE	SYMBOL	FEATURE
		Late and Post-Glacial Deposits
GSLL	L	Lacustrine or glaciolacustrine
GSLLP	Lp	Lacustrine Plain
GSLLB	Lb	Lacustrine Blanket
GSLLR	Lr	Lacustrine Beach, Bar, Spit
GSLW	W	Marine or Glaciomarine Deposits
GSLWP	Wp	Marine Plain
GSLWB	Wb	Marine Blanket
GSLWR	Wr	Marine Beach, Bar, Spit
		Glacial-Glaciofluvial Deposits
GSGG	G	Glaciofluvial Deposits
GSGGP	Gp	Outwash Plain
GSGGB	Gb	Glaciofluvial Blanket
GSGGD	Gd	Outwash Delta
GSGGG	Gg	Ice Contact Delta
GSGGR	Gr	Glaciofluvial Ridge
GSGGK	Gk	Kame
GSGGT	Gt	Kame Terrace
GSGGC	Gc	Kame and Kettle Complex
GSGGM	Gm	Kame Moraine
GSGGX	Gx	Glaciofluvial Complex
GSGAT	aT	Ablation Till
GSGATM	aTm	Ablation Moraine
GSGATB	aTb	Ablation Till Blanket
BSGBT	bT	Basal Till
GSGBTP	bTp	Till Plain
GSGBTM	bTm	Till Moraine
		Pre-Quaternary Surfaces
GSQR	R	Bedrock
GSQRA	Ra	Bedrock Veneered by Alluvial Deposits
GSQRC	Rc	Bedrock Veneered by Colluvial Deposits
GSQRE	Re	Bedrock Veneered by Eolian Deposits
GSQRG	Rg	Bedrock Veneered by Glaciofluvial Dep.
GSQRL	Rl	Bedrock Veneered by Lacustrine Dep.
GSQRT	Rt	Bedrock Veneered by Till Deposits
GSQRW	Rw	Bedrock Veneered by Marine or Glaciomarine Deposits

MINERAL DEPOSIT DATA FEATURE CODES

1) Surface weathering features GMW___
2) Mineral occurrences & deposits GMD___
3) Mineral excavations GME___

FEATURE CODE	SYMBOL	FEATURE
		Surface Weathering Features
GMWG3		Gossan
GMWKS3		Sinkhole, small
GMWKL3		Sinkhole, large
GMWH3		Hot Springs
GMWS3		Salt Springs
		Mineral Occurrences and Deposits
GMDMO3		Mineral Occurrence, Deposit
GMDSP3		Mineral Deposit (large) with Surface Projection
GMDMKO3		Stockwork Mineralization
GMDMMO3		Miscellaneous Metallic Mineralization
GMDMNO3		Non-Metallic Mineralization
GMDMTO3		Stratiform Mineralization
GMDMVO3		Vein Mineralization
GMDMWO3		Skarn Mineralization
		Mineral Excavations
GMEGO3		Sand & Gravel Deposit
GMEGA3		Sand & Gravel Deposit, Abandoned

FEATURE CODE	SYMBOL	FEATURE
GMEQO		Quarry or Mine, Operating
GMEQA		Quarry or Mine, Abandoned
GMESO		Shaft, Open
GMESA		Shaft, Abandoned
GMEW		Winze
GMER		Raise
GMEP		Blasted Pit
GMECT		Trench
GMECA		Open Cut, Axial
GMEAO		Adit, Open
GMEAA		Adit, Caved
GMETO		Tunnel, Open
GMETA		Tunnel, Caved
GMEOP		Limits of Open Pit
GMETW		Tailings Pond, Small
GMETR		Tailings Pile

MINERAL CLAIMS AND MINING LEASES FEATURE CODES

FEATURE CODE	SYMBOL	FEATURE
		Active Claims
GLCCB		Claim Boundaries
GLCCT	334762	Claim Number (text for polygon)
GLCBB		Claim Block Boundaries
GLCBT	03-1451	Claim Block (index number)
		Expired Claims
GLCEC		Expired Claim Boundaries
GLCECT	334761	Expired Claim Number (text)
GLCEB		Expired Claim Block Boundaries
GLCEBT	03-1212	Expired Claim Block (index number)
		Mining Leases
GLLAB		Mining Lease Boundary
GLLAT	Lease No. 253	Mining Lease Number

GEOPHYSICS FEATURE CODES

1)	Airborne Electromagnetic Surveys	GPAEM___
2)	Airborne Input Surveys	GPAIP___
3)	Ground Electromagnetic Surveys	GPGEM___
4)	Ground Gravimetric Surveys	GPGGV___
5)	Ground Magnetic Surveys	GPGMG___
6)	Ground Induced Potential Surveys	GPGIP___
7)	Ground Mise à la Masse Surveys	GPGMM___
8)	Ground Resistivity Surveys	GPGRS___
9)	Ground Self-Potential Surveys	GPGSP___
10)	Ground Radiometric Surveys	GPGRD___

FEATURE CODE	SYMBOL	FEATURE
		Airborne Electromagnetic Surveys
GPAEMAD		Aerodat Anomaly Axis
GPAEMA3		Aerodat Anomaly Rating
GPAEMDG		Dighem Anomaly Axis
GPAEMD3		Dighem Anomaly Rating
GPAEMTR		Turair Anomaly Axis
GPAEMT3		Turair Anomaly Rating
GPAEMRP		Radiophase-E phase Anomaly Axis
GPAEMR3		Radiophase-E phase Anomaly Rating
GPAEMFG		Afmag Anomaly Axis
GPAEMF3		Afmag Anomaly Rating
GPAEMEM		Multifrequency +/o Multicoil System Anomalies; Excluding Input
GPAEME3		Multifrequency Anomaly Rating
GPAEMVL		V.L.F. Anomaly Axis
GPAEMV3		V.L.F. Anomaly Rating
GPAEMFD		Flight Direction For Survey

FEATURE CODE	SYMBOL	FEATURE
		Airborne Input Surveys
GPAIP32		2 Channel Anomaly (with mho value) Axis
GPAIP33		3 Channel Anomaly Axis
GPAIP34		4 Channel Anomaly Axis
GPAIP35		5 Channel Anomaly Axis
GPAIP36		6 Channel Anomaly Axis
GPAIPCM		Coincident Magnetic Anomaly
GPAIPMM3		Marginal Magnetic Anomaly
GPAIPFD		Input Survey Flight Direction
		Ground Electromagnetic Surveys
GPGEMHM3		Horizontal-Loop Anomaly Axis
GPGEMVM3		Vertical-Loop Anomaly Axis
GPGEMVL3		V.L.F. Anomaly Axis
GPGEMTR3		Turam Anomaly Axis
GPGEMFE3		Frequency Domain E.M. Anomaly Axis
GPGEMTE3		Time Domain E.M. Anomaly Axis
		Ground Gravimetric Surveys
GPGGVAH		Axis of Gravity High Anomaly
GPGGVAL		Axis of Gravity Low Anomaly
GPGGVC		Contour for Pont Sampled Gravity Survey Data
GPGGVCT		Value of Gravity Contour in m gals

FEATURE CODE	SYMBOL	FEATURE
		Ground Magnetic Surveys
GPGMGD		Contour in Gammas
GPGMGDT		Contour Value
GPGMGH		Contour in Gammas (X100)
GPGMGHT		Contour Value (X100)
GPGMGT		Contour in Gammas (X1000)
GPGMGTT		Contour Value (X1000)
GPGMGDP		Contour Depression
		Ground Induced Potential Surveys
GPGIPTW		Weak Time Domain IP Anomaly Axis
GPGIPTM		Moderate Time Domain IP Anomaly Axis
GPGIPTS		Strong Time Domain IP Anomaly Axis
GPGIPTU		Time Domain IP Anomaly Axis, Intensity Unknown
GPGIPFW		Weak Frequency Domain IP Anomaly Axis
GPGIPFM		Moderate Frequency Domain IP Anomaly Axis
GPGIPFS		Strong Frequency Domain IP Anomaly Axis
GPGIPFU		Frequency Domain IP Anomaly Axis, Intensity Unknown
		Ground Mise à la Masse Surveys
GPGMMW		Weak Mise à la Masse Anomaly Axis
GPGMMM		Moderate Mise à la Masse Anomaly Axis
GPGMMS		Strong Mise à la Masse Anomaly Axis
GPGMMU		Mise à la Masse Anomaly Axis, Intensity Unknown

FEATURE CODE	SYMBOL	FEATURE
		Ground Resistivity Surveys
GPGRSH		Resistivity High Anomaly Axis
GPGRSL		Resistivity Low Anomaly Axis
		Ground Self-Potential Surveys
GPGSPA		Self-Potential Anomaly Axis
		Ground Radiometric Surveys
GPGRDUR		Uranium Anomaly Axis
GPGRDTH		Thorium Anomaly Axis
GPGRDUT		Uranium/Thorium Anomaly Axis
GPGRDTO		Total Radioactivity Anomaly Axis
GPGRDK		Potassium Anomaly Axis
GPGRDUK		Uranium/Potassium Anomaly Axis

NEW BRUNSWICK STRATIGRAPHY FEATURE CODES

Proterozoic	GDP___
Cambrian	GDC___
Ordovician	GDO___
Silurian	GDS___
Devonian	GDD___
Carboniferous - Undivided	GDCU___
Carboniferous - Mississippian	GDCM___
Carboniferous - Pennsylvanian	GDCP___
Triassic	GDT___
Quaternary	GDQ___

ROCKS OF ORDOVICIAN AGE (GDO)

FEATURE CODE	SYMBOL	ROCK NAME - DIVISION
		Miramichi Group (Cambrian-L. Ordovician)
GDOMGBS		Gordon Meadow Brook Formation
GDOMCRS		Chain of Rocks Formation
GDOMUOMV		Undivided Mafic Volcanic Rocks
GDOMUOFV		Undivided Felsic Volcanic Rocks
GDOMUOS2		Undivided Greywacke, Quartzwacke Sedimentary Rocks
GDOMUOS1		Undivided Quartzite, Phyllite Sediments
GDOMUOS		Undivided Sedimentary Rocks

FEATURE CODE	SYMBOL	ROCK NAME - DIVISION
		Fournier Group
GDOFDVV		Devereaux Formation
GDOFPVS		Pointe Verte Formation
GDOFPMS		Madran Member, Pointe Verte Formation
GDOFPGS		Guitar Brook Member, Point Verte Formation
GDOFMSS		Millstream Formation
GDOFSMV		Sormany Formation
GDOFUOMV		Undivided Mafic Volcanic Rocks
GDOFUOS		Undivided Sedimentary Rocks
GDOFUOM		Undivided Intrusives
		Tetagouche Group - Bathurst
GDOTETS		Elmtree Formation
GDOTBBS		Boucher Brook Formation
GDOTGBV		Grants Brook Formation
GDOTCLV		Canoe Landing Lake Formation
GDOTFBV		Flat Landing Brook Formation
GDOTNFV		Nepisiguit Falls Formation
GDOTVLS		Vallee Lourdes Formation
		Tetagouche Group - Hayesville
GDOTPDS		Push and Be Damned Formation
GDOTHBS		Hayden Brook Formation
GDOTBIS		Lower Birch Island Formation
GDOTBMS		Buttermilk Brook Formation

FEATURE CODE	SYMBOL	ROCK NAME - DIVISION
		Tetagouche Group - Benton
GDOTBLS		Belle Lake Slate
GDOTPMV		Pocomoonshine Volcanics
GDOTBES		Bright Eye Brook Formation
GDOTUQS		Unnamed Quartzose Sedimantary Rocks (Miramichi?)
		Tetagouche Group - General
GDOTUOS3		Undefined Quartzwacke, Greywacke Sedimentary Rocks
GDOTUOS2		Undefined Red Slates
GDOTUOS1		Undefined Black Slates
GDOTUOS		Undefined Sedimentary Rocks
GDOTUOMV		Undefined Mafic Volcanic Rocks
GDOTUOFV		Undefined Felsic Volcanic Rocks
GDOTUOFV		Undefined Porphyry
		Balmoral Group
GDOBPPS		Popelogan Formation
GDOBGBV		Goulette Brook Formation
GDOBUBS		Undivided Balmoral Group
		Grog Brook Group
GDOGUOS		Undivided Sedimentary Rocks

FEATURE CODE	SYMBOL	ROCK NAME - DIVISION
		Matapedia Group
GDOPUOS		Undivided Sedimentary Rocks
GDOPCML		Carys Mills Formation
		Cookson Group
GDOCKMS		Kendall Mountain Formation
GDOCDQS		Digdeguash Formation
GDOCWLS		Woodland Formation
GDOCCLS		Calais Formation
GDOCUOS		Undivided Cookson Group
		Ordovician Intrusives
GDOIMMG		Moose Lake Gabbro
GDOIFSG		Sweat Hill Granite
GDOIMU		Undivided Mafic Intrusions
GDOIFU		Undivided Felsic Intrusions

ROCKS OF SILURIAN AGE (GDS)

FEATURE CODE	SYMBOL	ROCK NAME - DIVISION
		Chaleurs Group
GDSCABS		Armstrong Brook Formation
GDSCCVS		Clemville Formation
GDSCLPL		Limestone Point Formation
GDSCLVS		La Vieille Formation
GDSCSCS		South Charlo Formation
GDSCBPV		Bryant Point Formation
GDSCNMS		New Mills Formation
GDSCBJV		Benjamin Formation
GDSCPRS		Petit Rocher Formation
GDSCUSS1		Undivided Clastic Sedimentary Rocks
GDSCUSSL		Undivided Limestones
GDSCUSS2		Undivided Red & Green Clastic Sedimentary Rocks
GDSCUSMV		Undivided Mafic Volcanics
GDSCUSFV		Undivided Felsic Volcanics
		Perham Group
GDSPSGS		Siegas Formation
GDSPSMS		Smyrna Mills Formation
GDSPUQS		Upsalquitch Formation
GDSPHDS		Hazeldean Formation
GDSPUSS		Undivided Sedimentary Rocks
GDSPUSV		Undivided Volcanic Rocks

FEATURE CODE	SYMBOL	ROCK NAME - DIVISION
		Unnamed Group
GDSUSSS		Scott Siding Slate
GDSUPCS		Pocowogamis Conglomerate
GDSUUSS		Undivided Sedimentary Rocks
		Kingsclear Group
GDSKUSS3		Unnamed Green & Maroon Slate, Greywacke
GDSKUSS2		Unnamed Quartz "Eye" Greywacke
GDSKUSS1		Unnamed Lithic Wacke, Slate, Conglomerate
GDSKUSS		Undefined Sedimentary Rocks
		Mascarene Group
GDSMEPS		Eastport Formation
GDSMUSS		Undefined Sedimentary Rocks
GDSMUSV		Undefined Volcanic Rocks
		Unnamed Group
GDSUJCS		Jones Creek Formation
GDSULRV		Long Reach Formation
GDSUQBS		Queens Brook Formation
GDSUUSS		Undefined Sedimentary Rocks
GDSUUSV		Undefined Volcanic Rocks

FEATURE CODE	SYMBOL	ROCK NAME - DIVISION
		Unnamed Group
GDSUWWS		Waweig Formation
GDSUOBS		Oak Bay Formation
GDSUUWS		Undivided Sedimentary Rocks
		Unnamed Group
GDSUFRS		Flume Ridge Formation

ROCKS OF LATE DEVONIAN-MISSISSIPPIAN AGE

FEATURE CODE	SYMBOL	ROCK NAME - DIVISION
		Horton Group (Southeast New Brunswick)
GDCMHMTS		Moncton Formation
GDCMHMHS		Hillsborough Member, Moncton Formation
GDCMHMWS		Weldon Member, Moncton Formation
GDCMHAS		Albert Formation
GDCMHAGS		Gautreaux Member, Albert Formation
GDCMHAHS		Hiram Brook Member, Albert Formation
GDCMHAFS		Frederick Brook Member, Albert Formation
GDCMHADS		Dawson Settlement Member, Albert Formation
GDCMHMCS		Memramcook Formation
GDCMHUMS		Undefined Sedimentary Rocks
		Unnamed Group (Kings County)
GDCMUKS		Kennebecasis Formation
		Windsor Group (Southeast New Brunswick)
GDCMWCLS		Cassidy Lake Formation
GDCMWUPS		Upperton Formation
GDCMWPVS		Parleeville Formation
GDCMWMCS		Macumber Formation
GDCMWGRS		Gays River Formation
GDCMWUMS		Undefined Sedimentary Rocks

FEATURE CODE	SYMBOL	ROCK NAME - DIVISION
		Windsor Group (Kings County)
GDCMWCHS		Clover Hill Formation
GDCMWCSS		Southfield Member, Clover Hill Formation
GDCMWCLS		Lakefield Member, Clover Hill Formation
GDCMWEMS		Undefined Evaporitic Sedimentary Rocks
		Unnamed Group (Kings County)
GDCMURHS		Round Hill Formation
GDCMUSHS		Samp Hill Beds
		Piskahegan Group
GDCMPKS		Kleef Formation
GDCMPSP		Seelys Formation
GDCMPCS		Carrow Formation
GDCMPRP		Rothea Porphyry
GDCMPIBS		Image Brook Redbeds
GDCMPSOV		South Oromocto Basalts
GDCMPMUV		Undefined Volcanic Rocks
GDCMPMUS		Undefined Sedimentary Rocks
		Unnamed Group
GDCMUGL		Gelder Limestone
		Beaver Harbour Group
GDCMBUS		Unnamed Sedimentary Rocks

ROCKS OF LATE MISSISSIPPIAN-PENNSYLVANIAN AGE

FEATURE CODE	SYMBOL	ROCK NAME - DIVISION
		Hopewell Group (Moncton)
GDCHERS		Enrage Formation
GDCHSPS		Shepody Formation
GDCHMGS		Maringouin Formation
GDCHUCS		Undefined Sedimentary Rocks
		Hopewell Group (Kings County)
GDCHSBS		Scoodic Brook Formation
GDCHWMS		Wanamaker Formation
GDCHPOS		Poodiac Formation
GDCHUHS		Undefined Sedimentary Rocks
		Unnamed Group (Harvey Area)
GDCUURS2		Unnamed Red Clastic Sedimentary Rocks
GDCUHFV		Harvey Formation
GDCUHHMV		Harvey Mountain Member, Harvey Formation
GDCUHYMV		York Mills Member, Harvey Formation
GDCUURS1		Unnamed Red Siltstone
GDCUUCV		Undefined Volcanic Rocks
GDCUUCS		Undefined Sedimentary Rocks

FEATURE CODE	SYMBOL	ROCK NAME - DIVISION
Rocks of Unnamed Groups, But Stratigraphic Equivalents		
		Unnamed Group (Saint John Area)
GDCUSLC		Lancaster Formation
GDCUSBL		Balls Lake Formation
GDCUSS1		Unnamed Red Clastic Sedimentary Rocks
GDCUSS		Undefined Sedimentary Rocks
		Unnamed Group (East Saint John)
GDCUSTC		Tynemouth Creek Formation
		Unnamed Group (York, Sunbury Counties)
GDCUYUV		Unnamed Basalt
GDCUYSRB		Shin Redbeds
		Unnamed Group (Hopewell Group; Minto, Chipman)
GDCUMHRV		Hardwood Ridge Basalt
GDCUMNCR		Newcastle Creek Formation
GDCUMUS		Undefined Sedimentary Rocks
		Unnamed Group (Carleton County)
GDCUCMVS		Mountain View Formation
GDCUCCS		Carlisle Formation
GDCUCUS		Undefined Sedimentary Rocks

FEATURE CODE	SYMBOL	ROCK NAME - DIVISION
		Unnamed Group (Victoria County)
GDCUVURS		Unnamed Clastic Red Sedimentary Rocks
GDCUVPRS		Plaster Rock Formation
GDCUVPRU		Upper Member Plaster Rock Formation
GDCUVPRL		Lower Member Plaster Rock Formation
GDCUVARS		Arthurette Redbeds
GDCUVGWV		Gladwyn Basalt
GDCUVUS		Undefined Sedimentary Rocks
		Unnamed Group (Gloucester County)
GDCUVGBS		Bathurst Formation
GDCUVGCS		Clifton Formation
GDCUVGUS		Undefined Sedimentary Rocks
		Unnamed Group (Restigouche County)
GDCUVRBS		Bonaventure Formation
GDCUVRUS		Undefined Sedimentary Rocks

ROCKS OF PENNSYLVANIAN AGE

FEATURE CODE	SYMBOL	ROCK NAME - DIVISION
		Petitcodiac Group
GDCPPTS		Tormentine Formation
GDCPPRS		Richibucto Formation
GDCPPSS		Salisbury Formation
GDCPPBPS		Boss Point Formation
GDCPPUS		Undefined Sedimentary Rocks
		Unnamed Group
GDCPUSCS		Sunbury Creek Formation
GDCPUHCS		Hurley Creek Formation
GDCPUHMS		Minto Formation
GDCPUUS		Undefined Sedimentary Rocks
		Intrusives
GDCIBHF		Beech Hill Stock
GDCIMLF		Millican Lake Intrusions
GDCISRF		Sorrel Ridge Stock

ROCKS OF PROTEROZOIC AGE (GDP)

FEATURE CODE	SYMBOL	ROCK NAME - DIVISION
		Coldbrook Group
GDPCUPS		Upper Sedimentary Rocks
GDPCLWS		Lower Sedimentary Rocks
GDPCUV		Undivided Volcanic Rocks
GDPCUS		Undefined Sedimentary Rocks
		Greenhead Group
GDPGABS		Ashburn Formation
GDPGMTS		Martinon Formation
GDPGUS		Undefined Sedimentary Rocks
		Golden Grove Intrusives
GDPIGBG		Brookville Gneiss
GDPIGDLG		Duck Lake Gabbro
GDPIGFG		Fairville Granite
GDPIGIG		Indiantown Gabbro
GDPIGMLD		Mayflower Lake Quartz Diorite
GDPIGMHG		Milkish Head Granite
GDPIGRP		Renforth Pluton
GDPIGRPG		Rockwood Park Granodiorite
GDPIGUMI		Undefined Meta-intrusives

FEATURE CODE	SYMBOL	ROCK NAME - DIVISION
		Felsic Intrusives
GDPIFBBP		Bonnel Brook Pluton
GDPIFCBP		Caledonia Brook Pluton
GDPIFCRS		Caledonia Road Sill
GDPIFCHG		Chance Harbour Granite
GDPIFCCS		Crooked Creek Sill
GDPIFFFS		Forty-Five River Sill
GDPIFGCS		Goose Creek Sill
GDPIFMCS		Memel Creek Sill
GDPIFMQG		Musquash Granite
GDPIFPWP		Point Wolfe River Pluton
GDPIFUMP		Upham Mountain Pluton
GDPIFWRS		West River Sill
GDPIFUFI		Undefined Felsic Intrusives
		Mafic Intrusives
GDPIMAS		Alma Stock
GDPIMCMS		Caledonia Mountain Stock
GDPIMLD		Lepreau Diorite
GDPIMMSG		Mechanic Settlement Gabbro
GDPIMOLP		Otter Lake Pluton
GDPIMUMI		Undefined Mafic Intrusives

ROCKS OF CAMBRIAN AGE (GDC)

FEATURE CODE	SYMBOL	ROCK NAME - DIVISION
		Saint John Group
GDCJRFS		Reversing Falls Formation
GDCJSFS		Silver Falls Formation
GDCJKSS		King Square Formation
GDCJFHS		Forest Hills Formation
GDCJHBS		Hanford Brook Formation
GDCJGFS		Glen Falls Formation
GDCJRBS		Ratcliffe Brook Formation
GDCJUCS		Undefined Sedimentary Rocks
		Intrusives
GDCIBRF		Black River Intrusion

ROCKS OF DEVONIAN AGE (GDD)

FEATURE CODE	SYMBOL	ROCK NAME - DIVISION
		Dalhousie Group
GDDDASV		Archibald Settlement Formation
GDDDJRS		Jacquet River Formation
GDDDSSV		Sunnyside Formation
GDDDLSS		Louison Creek Formation
GDDDUMV		Undivided Mafic Volcanic Rocks
GDDDUFV		Undivided Felsic Volcanic Rocks
GDDDUDS		Undivided Sedimentary Rocks
		Unnamed Group
GDDUCBS		Campbellton Formation
		Unnamed Group
GDDUTCS		Temiscouata Formation
		Tobique Group
GDDTWKS		Wapske Formation
GDDTCTV		Costigan Mountain Formation
GDDTCMV		Cameron Mountain Formation
GDDTUMV		Undivided Mafic Volcanic Rocks
GDDTUFV		Undivided Felsic Volcanic Rocks
GDDTUDS		Undivided Sedimentary Rocks

FEATURE CODE	SYMBOL	ROCK NAME - DIVISION
		Unnamed Group
GDDUHTS		Hartin Formation
GDDUDHV		Dorrington Hill Formation
		Unnamed Group
GDDUCCS		Coal Creek Formation
		Unnamed Group
GDDUPSAB		Perry Formation (St. Andrews Basin)
GDDUPSAS		St. Andrews Member, Perry Formation
GDDUPJPV		Joes Point Basalt Member, Perry Formation
GDDUPBCS		Brandy Cove Member, Perry Formation
GDDUPLCV		Loring Cove Basalt Member, Perry Formation
GDDUPLCS		Lamb Cove Member, Perry Formation
GDDUPBHB		Perry Formation (Blacks Harbour Basin)
GDDUPLHS		Letang Harbour Member, Perry Formation
GDDUPFIS		Flea Island Member, Perry Formation
GDDUPMIS		McCann Island Member, Perry Formation
GDDUPBHS		Blacks Harbour Member, Perry Formation
GDDUPPPS		Pea Point Member, Perry Formation
GDDUPDHS		Deadman Harbour Member, Perry Formation
GDDUPUS		Undefined Sedimentary Rocks
GDDUPUV		Undefined Mafic Volcanic Rocks

FEATURE CODE	SYMBOL	ROCK NAME - DIVISION
		Intrusives
GDDIALF		Antinouri Lake Granite
GDDIBLM		Becaguimec Lake Gabbro
GDDIBTF		Benton Granite
GDDIBBF		Bogan Brook Granodiorite
GDDIBGF		Bois-Gagnon Quartz Monzonite
GDDICHF		Charlo Granite
GDDICBG		Clearwater Brook Gabbro
GDDIDPF		Dow Porphyry
GDDIELF		Eagle Lake Stock
GDDIEVF		Evandale Stock
GDDIGBF		Gibson Granodiorite
GDDIGLM		Goodwin Lake Gabbro
GDDIHPF		Howard Peak Granodiorite
GDDIJBF		Juniper Barren Granite
GDDILLF		Lost Lake Granite
GDDIMHF		Mohannas Stock
GDDIMEF		Mount Elizabeth Granite
GDDINWF		Nashwaak Granite
GDDINDF		Nicholas Denys Granodiorite
GDDINPF		Nigadoo Porphyry
GDDINDRF		North Dungarvon River Granite
GDDIPPF		Pabineau Falls Granite
GDDISWM		Stewarton Complex

FEATURE CODE	SYMBOL	ROCK NAME - DIVISION
GDDISSM		St. Stephen Complex
GDDITHF		Tower Hill Stock
GDDIWPBM		West Portage Brook Troctolite
GDDIBHF		Burnthill Granite
GDDIDGF		Dungarvon Granite
GDDINPSF		North Pole Stream Granite
GDDIRBF		Rocky Brook Granite
GDDISBF		Sisters Brook Granite
GDDITBF		Trout Brook Granite
GDDIRMF		Redstone Mountain Granite
GDDIUDF		Unnamed Devonian Felsic Intrusives
GDDIUDM		Unnamed Devonian Mafic Intrusives
		Multiple Intrusives
GDDPIF		Pokiok Batholith
GDDPIHT		Hartfield Tonalite
GDDPSLG		Skiff Lake Granite
GDDPIUF		Undefined Felsic Intrusive Rocks
GDDGIF		Saint George Batholith
GDDGIBC		Bocabec Complex
GDDGIMGG		Magaguadavic Granodiorite
GDDGMDG		Mount Douglas Granite
GDDGIUG		Utopia Granite
GDDGIWC		Welsford Complex
GDDGIUF		Undefined Felsic Intrusive Rocks

ROCKS OF TRIASSIC AGE (GDT)

FEATURE CODE	SYMBOL	ROCK NAME - DIVISION
		Fundy Group - Bay of Fundy
GDTFUQS		Unnamed Quartzose Sandstone
GDTFSBS		Scots Bay Formation
GDTFNBV		North Mountain Basalt
GDTFBDS		Blomidon Formation
GDTFUTS		Undefined Sedimentary Rocks, St. Martins
GDTFECS		Echo Cove Formation
GDTFQCS		Quaco Formation
GDTFHPS		Honeycomb Point Formation
GDTFUSS		Undefined Sedimentary Rocks, Maces Bay
GDTFLPS		Lepreau Formation
		Intrusives
GDTICQM		Caraquet Dike
GDTIUTM		Undefined Mafic Dykes